

REMARKS/ARGUMENTS

The Office Action mailed September 29, 2004 has been reviewed and carefully considered. Claim 7 has been amended. Claims 1- 18 are pending in this application, with claims 1 and 21 being in independent form. New claims 19-21 have been added. New dependent claims 19 and 20 depend from claim 1, and new independent claim 21 is a method claim reciting the steps that correspond to the limitations recited in claim 1. Reconsideration of the above-identified application, as herein amended and in view of the following remarks, is respectfully requested.

By this amendment, the application now has a total of 21 claims, with 2 independent claims. Enclosed is a check for \$50 for the additional dependent claim.

Claim Objections:

Claim 7 is objected to as containing a minor informality. Claim 7 has been amended to cure the minor informality.

Claim Rejections - 35 U. S. C. 102 (b):

Claims 1-9 and 13-18 stand rejected under 35 U. S. C. §102 (b) as being anticipated by U.S. Patent No. 5,579,345 to Kroeger et al. (Kroeger). The Examiner stated essentially that Kroeger teaches all the limitations of the claims 1-9 and 13-18.

The present invention relates to a synchronizer for use in a wireless receiver in a telecommunication system. The current application describes a hybrid frequency synchronizer and synchronization method, where a digital step size estimation and correction procedure is performed after an analogue frequency control step is performed.

More specifically, according to the exemplary embodiment of the present invention as illustrated in Fig. 4 and 5, the estimating means includes a step size estimator 28 that estimates the actual step size of the digital to analogue converter 18 to allow the effects of temperature, aging and etc. to be compensated. In detail, in a first time slot, the step size estimator estimates the step size between a first level representing the best value frequency selected as the control word to control the analogue mixer 6 and the actual frequency level. In a second time slot, the step size estimator estimates the step size between a second best value frequency used as the control word in the second time slot to control mixer 6. The step size estimator then compares these two estimations and gives an estimate of the actual step size. This information is then used by the digital automatic frequency control DAFC 24 to determine the fine error correction for the next time slot.

Independent claim 1 recites, *inter alia*, "means for providing a digital control signal, said control signal defining a plurality of different levels; means for controlling the level provided by successive ones of said control signals, successive ones of said control signal defining different values; and means for estimating the difference between the levels of successive ones of said control signals."

Kroeger teaches a frequency control circuit using a frequency locked loop (see col. 2, lines 38-42). Although the Kroeger patent contains description of synchronized filters and frequency control and there are components that are related to synchronization, Kroeger does not teach a synchronizer that comprises means for providing analogue and digital hybrid control of changes between successive frequency levels, even less about specific solutions related to controlling the levels of successive signals and estimating the difference between the levels of successive control signals, essentially as claimed in claim 1.

The section of Kroeger referred to by the Examiner in the rejection of Claim 1 merely describes a QPSK encoder, which produces an output signal whose phase is changed on the basis of two digital input signals (col. 5 line 65 - col. 6, line 12). As Fig. 4 of Kroeger indicates, the encoder produces a specific phase difference in relation to its previous output when presented new input data. Claim 1 recites an element that performs accurate frequency correction by defining the frequency levels of digital control signals and controlling the frequency levels of successive digital control signals. Claim 1 further recites an element that estimates the difference between the frequency levels of successive control signals. In contrast to the claimed invention, the encoder disclosed in Kroeger merely determines the difference between the phases of two consecutive encoder outputs. More specifically, the encoder of Kroeger does not define nor control the levels of the control signals, let alone estimate the difference between the levels of the successive signals, as expressly recited in independent claim 1. Thus, the specific phase difference disclosed by Kroeger can not be considered to teach or suggest means for providing a digital control signal, and the control signal defines a plurality of different levels; means for controlling the level provided by successive control signals, and the successive levels of the control signals define different values; and means for estimating the difference between the levels of successive levels of the control signals, as recited in claim 1. To anticipate a claim for a patent, a single prior source must generally contain all the essential elements of the claim. See *W. L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983). Since Kroeger fails to teach nor disclose each of the essential elements recited in claim 1, no anticipation can be found.

Further, Kroeger does not disclose a structure that is capable of performing the functional limitations of the means recited in claim 1. Thus, Kroeger can not anticipate claim 1 since the Kroeger reference failed to either inherently or explicitly disclose each and every element

of the claimed invention arranged as in claim 1. The limitations which must be met by an anticipatory reference are those set forth in each statement of functions recited in the claims. Such a limitation cannot be met by an element in a reference that performs a different function, even though it may be part of a device embodying the same general overall concept. See *RCA Corp. v. Applied Digital Data Sys.*, 730 F. 2d 1440, 221 USPQ 385 (Fed. Cir. 1984). Even though Kroeger discloses a frequency locked loop that includes a RF section and a processor board, which further include, *inter alia*, analog to digital converter (A/D), digital to analog converter (D/A), digital signal processor, (see col. 4, lines 16 to 60), these elements in Kroeger fail to disclose the means for controlling the level and means for estimating the difference between the levels of successive ones of said control signals, as recited in claim 1. Therefore, claim 1 is believed to be patentable over Kroeger.

Claims 2- 18 depend from claim 1. Claims 2-18 are believed to be allowable for at least the reasons given for claim 1. The Examiner's reconsideration of the rejections is respectfully requested.

Dependent claim 2 recites that "said digital control signal is converted into an analogue control signal". The Examiner refers to col. 4, lines 16-22, in Kroeger in the rejection of claim 2. However, this section of Kroeger merely describes an RF section of a mobile terminal unit which includes a D/A converter 28 and a D/A converter 34. As described in col. 4, lines 34-48, the D/A converter is used for converting a transmit signal from digital to analog form, which analog signal is sent to the antenna for transmission. Since Kroeger merely discloses converting a transmit signal, there is no teaching or suggestion for converting a digital control signal generated by a synchronizer to analog form, as expressly recited in dependent claim 2. Therefore, claim 2 is allowable over Kroeger for these additional reasons.

Dependent claim 3 further recites that "said providing means, said controlling means and said estimating means are in the digital domain". The Examiner refers to col. 4, lines 32-61. This portion of Kroeger defines a processor board 20 of a transceiver 12 in a mobile terminal (see also col. 4, lines 12-15). The transceiver generates transmit signals (col. 4, lines 32-48) and receives signals from an antenna (col. 4, lines 49-61). As described in Kroeger, the received signals are processed as controlled by a controller processor 40, decoded and packaged for voice, fax or data processing. However, there is no teaching or suggestion in this section that the signals being processed are control signals which define a plurality of levels. Furthermore, there is especially no teaching or suggestion for the means for estimating the differences between the levels of successive ones of said control signals in the digital domain, as recited in dependent claim 3. In view of the above remarks, dependent claim 3 should also be allowable over Kroeger for these additional reasons.

Claim Rejections - 35 U. S. C. 103(a):

Claims 10-12 stand rejected under 35 U. S. C. §103(a) as being unpatentable over Kroeger. The Examiner stated essentially that Kroeger teaches or suggests all the limitations of claims 10-12.

Claims 10-12 depend from claim 1. Claims 10-12 are believed to be patentable over Kroeger for at least the reasons given for claim 1. The Examiner's reconsideration of the rejection is respectfully requested.


The application is now deemed to be in condition for allowance and notice to that effect is solicited.

If any additional fees or charges are required at this time in connection with the application, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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